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ABSTRACT

Based upon the communications process model of teaching and learning, the Miniaturized Total Interaction Analysis System (Mini-TIA) establishes a conceptual framework for observing symptomatic classroom behaviors. It provides a means for the evaluation of classroom communication. Interpersonal communication is defined as either verbal (using words) or nonverbal (involving gestures, mannerisms, and intonations of delivery). Mini-TIA is designed to focus on all aspects of communication: to emphasize content, personal development, and institutional aspects of communication events; to allow for student and teacher behavior; and to consider the students' perceptions of the communicative process. It is designed for use in large groups, and uses the time sampling technique in which each encoded event is given equal importance. The seven categories are: (1) reinforcement by the teacher; (2) use of student idea by the teacher; (3) content presentation by teacher; (4) control of students by teacher; (5) student talk about content; (6) student talk about personal needs; and (7) silence or multiple talking. (Detailed instructions for coding, tallying of results, and constructing an interpretive matrix are included). (GDC)

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HOW TO ANALYZE
VERBAL AND NONVERBAL CLASSROOM

COMMUNICATION

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Acknowledgements

The instrument presented in the following pages represents an attempt to extend the pioneering efforts of such instructional analysts and theoreticians as Withall, Flanders, Galloway and others. Readers will recognize elements of communication and behavior theories of Mead, Berlo and Goffman in the conceptual foundations of the new instrument. The author gratefully acknowledges the contributions of these and other scholars in the disciplines of education, communication and social-psychology.

Professor James K. Duncan of The Ohio State University is directly responsible for this researcher's initial efforts in communication analysis. Professor Charles M. Galloway, also of The Ohio State University, was the writer's primary tutor in communication. Alert readers will note the conceptual dependence of the new instrument upon Galloway's unique contributions in nonverbal communication. Special acknowledgement and thanks are due these two scholars for their wise counsel and support.

I. Introduction

The graduates of America's schools are going to live in a society which has mastered the atom and space travel, and which is gaining control over the bio-chemistry of life. These graduates are going to participate in ever more complex democratic processes and are going to compete for demanding occupations. In such a society the number of scholastic failures that can be tolerated will shrink and the demands for better teaching will increase.

Progress has been made on the improvement of teaching in America's schools and toward the generation of a valid theory of teaching-learning. Recent decades have seen a rapid growth in research about teaching and have produced certain achievements:

1. Teaching has been established as a researchable subject.
2. Basic research approaches and techniques for studies of teaching have been established.
3. Basic data about common teaching practices are now available.
4. A substantial base for further research efforts has been achieved.

Perhaps the landmark achievement has been the emergence of a teaching analysis movement with promise of instructional improvement through teacher self-analysis.

Early efforts at instructional analysis were usually limited in conceptual scope to isolate variables and improve experimental rigor. Now that research data on several important dimensions of instruction exists, it is possible to combine conceptual approaches. Multi-dimensional approaches to analysis of educational episodes more nearly approximates the complexities of teaching than was previously possible.

Instruction is a communication process. Much of the time the teacher acts as prime communicator in a large group setting. Often she utilizes various media such as charts, maps, books and movies as indirect communication agents. Sometimes she merely establishes an environment for productive communication and encourages small groups of students to interact. Yet, in every instance the instructor utilizes communication processes in order to teach.

Improvement of classroom communication through analysis of communication habits of teacher and student is a major avenue toward overall improvement of teaching and learning. Analysis of existing interaction patterns provides data for better professional insight and fuller self knowledge, thereby assuring an adequate base for improvement. This manual presents a unique analytical instrument which, when utilized with video recording equipment, provides the teacher and supervisor with an effective tool for improving classroom communication and student learning.

II. Teaching as Communication

A basic theorem of instruction is that teaching processes must be adapted to learner needs. The effectiveness of particular teaching strategies is determined by the learning that takes place. No other criterion of teaching effectiveness is as valid, reliable, and complete as resultant learning. It is appropriate and logical for educators to move from a consideration of teaching process as a discrete discipline to the study of the teaching-learning process as a unified whole. Classroom communication is a major part of the teaching-learning process because it is the medium by which learning takes place. If the total process is to be studied, it follows that communication must receive special emphasis.

According to Hough, "Teaching and learning, though distinctly different processes, are so closely related in the classroom that to attempt to better understand one while failing to give full attention to the other would seem to be an untenable approach to the development of a functional instructional theory. Yet, with few notable exception, this is what educators and psychologists have been doing for years." (Amidon and Hough, 1967, p. 375) It should be noted that researchers have had ample reason to specialize; it was this specialization which limited the scope of the research task, thereby making scientific progress possible. But Hough's concern is that the time

has come to seek out common threads between these previously discrete disciplines.

The possibility of a relationship between teaching and learning arose out of the simple observation that teachers often seem to be sending information and students seem to be receiving information. Was it possible that the concept of communication could provide an umbrella to cover teaching and learning?

Mead viewed communication as the medium for all learning; people learn by means of interaction with their environment (Mead, 1934).

Goffman has developed a complex theory of human growth and learning through the assumption of interactive roles and interaction with others. Learning comes via role playing, it does not come about in isolation (Goffman, 1959).

Research conducted by Davidson and Lang confirms the fact that learning is social and interactive in nature. They found that achievement was related to the student's perception of the teacher's opinion of and attitude toward the pupil. In other words, students are at least partially dependent in their learning processes upon communication from their teacher (Davidson and Lang, 1960).

Minter surveyed communication specialists for the most favored definition of communication. The following definition was found to be favored by most experts:

Communication does not refer to verbal, explicit, and intentional transmission of messages alone...The concept of communication would include all those processes by which people influence one another... This definition is based upon the premise that all actions and events have communicative aspects, as soon as they are perceived by a human being; it implies, furthermore, that such perception changes the information which an individual possesses and therefore influences him. (Minter, 1968). (Emphasis added)

Communication, then, is viewed as the medium of learning and is the key to educational processes.

The communication process requires six components:

1. communication source
2. encoder
3. message
4. channel
5. decoder
6. communication receiver

(Berlo, 1960, p. 32)

These ingredients are part of a highly complex process. In a classroom, the conventional view is to identify the teacher's mind as communication source, the delivery process of the teacher (speaking, gesturing, etc.) as encoding, the medium of role playing as channel, and so forth. Thus identified, the researcher constructs diagrams of communication events. Such procedures are common, but Berlo cautions:

It is useful to use these ingredients to talk about communication. It is dangerous to assume that one comes first, one last, or that they are independent of each other. This denies the concept of process, and communication is a process.

(Berlo, 1960, p. 38)

In a classroom each decoder must deal with many messages coming from various channels. A few of the messages to a student emanate from the teacher. Other messages come from other students, noisy airplanes, ticking clocks and so on. The receiver must filter out this "noise".

It is accepted pedagogical theory that the teacher must consider the needs of his students. It follows that one of the tasks of the teacher is to be prescriptive, to evaluate the student's learning processes and prescribe appropriate learning experiences. This approach is essentially communicative in nature. It did not originate with communication scholars, but it depends upon and functions through the communication medium and it is characterized by heavy teacher utilization of feedback from students.

Students, like teachers, also utilize feedback. In the view of Mead, feedback provides the data for organisms to alter their behavior. In Goffman's view, feedback provides the data for improvement of role performance. For Berlo, feedback provides the key to a learning process model which is equivalent to a model of communication (Berlo, 1969, p. 99).

If Berlo is correct, it becomes possible to envision a teaching-learning theory based upon a communication process model. The teacher and student both take part in the communication process, both send and receive messages, and both utilize feedback to alter their behavior patterns. Therefore, the Berlo model permits, in the conventional

classroom, an analysis of teaching and an analysis of learning because the teaching and learning processes are but different aspects of communication.

Most observational systems focus on the aspect of behavior which is appropriate to their particular purposes, but are limited to certain aspects of communication. By contrast, a communication analysis system would be general in focus, not limited to one aspect of teaching.

III. Nonverbal Communication

Communication theory covers all dimensions of interaction. Although each and every dimension of the communication process should receive equal attention, the nonverbal dimension has been given minimal consideration. This has been partly a result of traditional concern with words, and partly a result of the complexity and subtlety of the subject. Regardless of the cause of this situation, intensive research into nonverbal communication as it affects teaching is a comparatively recent development.

Nonverbal communication has been a topic of interest to psychologists (Davitz, 1964), social psychologists (Mead, 1934) and sociologists (Goffman, 1959) but until recently the potential of this area has escaped teaching behavior research. The pioneering work of Galloway demonstrates the feasibility of developing analytical procedures for the nonverbal dimension of communication (Galloway, 1962). Subsequently Galloway and French developed sophisticated tools for the analysis of verbal and nonverbal dimensions of interaction (Galloway and French, 1968; French, 1968; Galloway, 1968).

The most obvious characteristic of the literature about nonverbal communication is the lack of a common approach. Not only has this area been under investigation by scholars representing many diverse disciplines with resulting variations in approach and emphasis, but nonverbal as a concept has been subject to variations in definition. One research group used the term nonverbal to refer to psychopathic inability to be verbal: an inability to speak. This group also talked about nonverbal activity games used to encourage children to overcome their inability to speak (Skinner, 1957).

Even when the terms verbal and nonverbal are applied to communication or interaction there is considerable confusion as to basic definition. Flanders, for example, referred to his analysis technique as a method of observing "verbal interaction." (Amidon and Flanders, 1967). In practice his system recorded the aural dimension of interaction, that communication which can be heard. On the other hand, Bellack (Bellack, Davitz et. al., 1963) and Smith (Smith, 1967) reduced all interaction to written form and analyzed the typescripts.

Any person who has ridden in an automobile in the winter time with a passenger who announced that "I am cold" can recall that the pitch

and intonation of delivery affects the meaning of the statement. In this example the same words might have indicated a mild discomfort or a nearfreezing condition depending upon the style of delivery. Bellack and Smith would exclude such modifications of the words "I am cold", Flanders would include the affective conditioning of the statement, and both approaches were forms of analyzing "verbal" communication.

Research on various dimensions of communication seems to fall into three categories with individual researchers emphasizing one or two of the dimensions in their work and only a few scholars including all three portions. The actual spoken word reduced to written form represents one dimension. The area of facial expression, body movements and those aspects of communication which are primarily visual in nature represent another. A third aspect of communication is the area of vocal modification to the sound of words -- a non-visual area. This is included or excluded in research on the preference of the individual researcher. As far as definition of the terms verbal and nonverbal are concerned, this portion is also subjected to arbitrary treatment.

Langer and Davitz provided a useful base for resolving the definitional problem. In 1942, Langer divided interaction into discursive and nondiscursive dimensions. Discursive was characterized by syntax, order, replicability and referred to words. Nondiscursive lacked these characteristics entirely. Davitz subsequently found that

the criteria proposed by Langer were not perfect in the nonverbal dimension but the basic concept remained sound (Davitz, 1963, p. 38). When the concepts of Davitz and Langer are applied, it seems that the portion of communication having to do with a use of words is more cognitive, is characterized by syntax, and is exactly reproducible. When a particular object is identified as a "table", the precise meaning is available and can be re-transmitted in the same manner at some future time. When the term "table" is used in a sentence, it is subject to the rules of symbolism, grammar, and formal logic. A discursive message like "that is a kitchen table" has a relatively precise meaning, whereas the meanings of nondiscursive facial expressions are less precise.

The other aspects of communication, the nondiscursive areas of vocal modification to word sounds and visual communication are radically different from the written word. Neither of these areas has a formal syntax nor a formal grammar. They are characterized by a relative lack of symbolism. These areas involve imprecise messages and differ in that one is visually received and the other aurally received; but both dimensions are affective, are subject to multiple meaning, and convey messages which are hard to replicate. The characteristics of the three portions of communication are summarized in Table 1.

Table 1 The Verbal and Nonverbal
Dimensions of Communication

<u>VERBAL</u>	<u>NONVERBAL</u>	
WORDS	VOCAL MODIFICATION OF WORDS	FACIAL EXPRESSION AND BODY SIGNALS
COGNITIVE HIGHLY SYMBOLIC- FORMAL MEANING EASILY RE- TRANSMITTED FORMAL SYNTAX AND GRAMMAR HIGH PRECISION IN TRANSMISSION WRITTEN OR VOCAL	AFFECTIVE LOW SYMBOLIC- INFORMAL MEANING HARD TO RE- TRANSMIT INFORMAL SYNTAX LOW PRECISION VOCAL ONLY	AFFECTIVE LOW SYMBOLIC- INFORMAL MEANING HARD TO RE- TRANSMIT INFORMAL SYNTAX LOW PRECISION VISUAL ONLY

Perhaps the definition of verbal ought to be restricted to the area of highly formal and symbolic communication: words. Nonverbal would include the two affective dimensions of communication. Essentially, verbal corresponds to that which can be recorded on a typescript and nonverbal to the other aspects of communicating. Such a definition corresponds to Webster and is highly functional.

Ever since Galloway determined that nonverbal behavior of teachers could be analyzed successfully, there has been an increasing concern among researchers with the effects of nonverbal teacher behavior and with improving methods of studying this elusive dimension of communication. A recent study produced the highly significant result that 60% of all communication events were nonverbal, thereby confirming the need to include the nonverbal dimension in any complete analysis of communication (Evans, 1968). Earlier studies by Davitz and others have determined that the nonverbal and verbal dimensions of the message transmission must agree if the message transmitter is to appear credible. In addition, where a lack of verbal-nonverbal congruence exists, the message decoder tends to accept the nonverbal aspect of the events as conveying the genuine meaning (Davitz, 1963).

Galloway insists that the nonverbal dimension of classroom communication must be considered along with verbal interaction not with the purpose of uncovering hidden meanings or intent, but rather with

the purpose of determining the effect the nonverbal dimension has on the total interaction. He explains that nonverbal language, while often overlooked, can be quite informative:

During ordinary classroom talk between a teacher and pupils it may appear that an exchange of information is occurring exclusively at the verbal level, but a freightage of meanings is interchanged at the nonverbal level also. There are an indefinite number of signs and signals that serve the purpose of what we may term nonverbal language. Such a conclusion can be stated because pupils are reading the meaning of the expressions and conduct of a teacher whether the teacher likes it or not.

(Galloway, quoted in Hyman, 1968, p. 71)

IV. Analyzing Classroom Communication with Mini-TIA

Mini-TIA provides a technique for representating the condition of classroom interaction which is analagous to medical techniques of building an image of the condition of a heart. The physician develops an image of the heart's condition without direct examination. Rather, he observes blood pressure and listens to the sounds of the patient's chest and synthesizes an image of the heart's condition from this observable evidence. With classroom communication direct observation is impossible at the current state of educational research. We know that interaction is that mysterious zone between the sender and receiver, but we cannot see it. Nor can the effect of the communication event be observed.

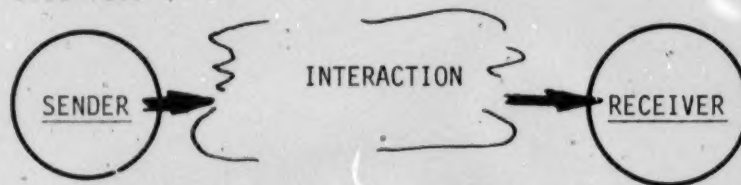


Figure 1 A Representation of the Communication Process

Yet it is possible to observe symptoms of interaction: symptoms which take the form of behaviors at the ends of the communication chain. The behaviors of sender and of receiver are symptomatic of the interaction and provide indications of the nature and effect of communication. Mini-TIA establishes a conceptual framework for the observing symptomatic behaviors of the teacher and of the class.

It provides a means for the evaluation of classroom communication.

The medium of interpersonal communication is composed of two dimensions which are defined for the purpose of Mini-TIA as verbal and nonverbal. The precise definitions of these terms is critically important because the terms do not merely refer to spoken and unspoken interaction. Verbal can be defined as that which consists of or has to do with words, only. Nothing in Webster's definition allows for the inclusion of intonations in the delivery of the words. By contrast, nonverbal interaction is more than the gestures and mannerisms which accompany the words. Nonverbal interaction includes the intonations of delivery as well as those mannerisms which are commonly recognized as nonverbal.

Verbal includes the denotative meaning of words. Langer's concept of discursive communication matches the verbal dimension of interaction (Davitz, 1964, p. 38). Discursive communication is that communication which possesses clearly defined meaning, syntax, and order and symbolism.

Although Langer's definition of the complementary phase of communication has been questioned, her main criterion of nondiscursive communication serves the nonverbal phase of interaction well. The content of this phase is interpreted on an intuitive basis. That is, the nonverbal component of interaction is less formal and less rigid area of gestures, mannerisms, intonations, inflections and manipulations of pace. This component carries much of the emotional message.

The definition of verbal and nonverbal does not correspond to the aural and visual dimensions of interaction. Nonverbal interaction includes all of the visual dimension and, in addition, includes certain affective portions of the aural dimension such as inflections. Verbal interaction is restricted to the formal language used in the message.

It is interesting to note that teacher and pupil, alike, are conditioned to restrain their verbal utterances and communicate only a portion of their intent in this dimension. The nonverbal expression, by contrast, is a much more open mode of interaction in which teacher and student more nearly reveal their true feelings or intent. Hence, the nonverbal dimension of communication can provide greater depth in meaning than the verbal and thereby provide a potent resource for behavior and communication analysis.

Courtesy requires that only one person speak at a time, but messages are continually transmitted by everyone. Some of these transmissions are intentional while others are unintended. The teacher can often read the students' nonverbal messages as he, the teacher, talks. The reverse is true of students. All participants in interaction depend upon nonverbal signals from the total group to assess their impact upon the ongoing interaction. Teachers look to

students for signs of attentiveness and understanding. Students observe the teacher and their fellow students for support and encouragement. Davitz found that these nonverbal messages are valued highly. In fact, where conflict or incongruence between verbal and nonverbal exists, people tend to believe the nonverbal dimension.

The nonverbal aspect of classroom communication is interesting and worthy of study, but the real impact of nonverbal occurs in concert with verbal. As educators, our concern is how the teacher conducts the total communication process in order to maintain an orchestrated balance in the total process and in the impact of communication events upon students. It is here that the Miniaturized Total Interaction Analysis System makes its contribution.

Mini-TIA was designed to be a system of communication analysis which includes all aspects of communication, is faithful to existing teacher behavior research and accounts for learner's perception of classroom interaction. The following design criteria were incorporated in Mini-TIA:

1. Focus on all aspects of communication with carefully defined verbal and non-verbal dimensions of interaction.
2. Category zones emphasizing content, personal development and institutional aspects of communication events.
3. Reciprocal categories.

4. Primary observer focus upon the student view of communication events and upon the completeness of interaction.

It was determined that five features were necessary to meet the demands of the design criteria and of the purposes of the system.

These characteristics are:

1. The inclusion of the Flanders indirect-direct concept in order to build upon the existing body of research.
2. The use of time sampling procedures with matrix data interpretation.
3. The inclusion of the Galloway nonverbal concepts.
4. The use of a broad view of communication events with reciprocal categories.
5. The limitation of the number of categories for compactness, economy, and efficiency.

This new system was given the name Miniaturized Total Interaction Analysis System (Mini-TIA). Miniaturized refers to the attempt to make the tool as compact and easily learned as possible. Total refers to the encoding of all aspects of communication: verbal, nonverbal, teacher and student in a reciprocal and complete process manner. Interaction Analysis recognizes the theoretical heritage of the new system.

The Mini-TIA Categories

Mini-TIA is a fourteen category observational framework. There are seven verbal categories and two nonverbal dimensions corresponding

to each verbal category. Every three seconds the communication events are encoded with a number representing the appropriate verbal category and with a suffix (+ or -) for the nonverbal dimension. For example, sincere praise by the teacher is recorded as 1+ while insincere praise would be recorded as 1-.

1. The Nonverbal Dimension

The positive nonverbal symbol (+) implies that the communication was positive, successful and complete, that the verbal and nonverbal dimensions of message transmissions agreed and were congruent, that the receiver was physically able to receive the message, and that successful decoding took place.

The negative nonverbal symbol (-) is used whenever the communication process breaks down, when there is a lack of verbal-nonverbal congruence, when there is a transmission/reception difficulty, or when there is a restricting tendency in the interaction.

For example, a lecture would be encoded as 3+ if it met all of these criteria:

- a. The teacher's message was congruent: his nonverbal message supported the verbal message.
- b. The students were able to hear and were listening.
- c. There was a climate which tended to encourage attention to the lecture.

Table 2 The Mini-TIA CATEGORIES

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ROLE	CATEGORY NUMBER	Verbal Events	Nonverbal Events		
The teacher's role in the student's personal development of the student's	1	REINFORCEMENT BY THE TEACHER: Teacher accepts student feeling, praises, encourages student. Any teacher expression reinforcing student except use of student idea.	+	vs	-
			Sincere	vs	Insincere
			Supportive	vs	Non-supportive
			Appropriate	vs	Excessive
	2	USE OF STUDENT IDEA BY THE TEACHER: Significant development of idea first introduced by a student. More than a mere repetition of idea.	+	vs	-
			Implementing	vs	Perfunctory
			Sincere	vs	Insincere
			Supportive	vs	Non-supportive
			Appropriate	vs	Excessive
The teaching role	3	CONTENT PRESENTATION BY TEACHER: Teacher lectures and questions.	+	vs	-
			Spirited	vs	Monotonous
			Responsive	vs	Unresponsive
			Congenial	vs	Uncongenial
The institutional role	4	CONTROL OF STUDENTS BY TEACHER: Teacher directs, commands, orders, corrects, criticizes or justifies authority.	+	vs	-
			Facilitating	vs	Punitive
			Adjusting	vs	Corrective
			Concerned	vs	Distainful

Table 2 (Continued)

ROLE	CATEGORY NUMBER	Verbal Events	Nonverbal Events	
The learning role	5	STUDENT TALK ABOUT CONTENT: All student talk which is relevant to student learning whether directly connected to lesson pattern or not.	+	vs -
			Responsive Supportive Eliciting	vs Unresponsive vs Non-supportive vs Suppressing
The personal growth role	6	STUDENT TALK ABOUT PERSONAL NEEDS: All student talk which is unrelated to any cognitive learning but which relates to personal needs, desires, wants, or frustrations.	+	vs -
			Supportive Eliciting Concerned	vs Non-supportive vs Suppressing vs Distainful
	7	SILENCE OR MULTIPLE TALKING:	+	vs -
			Comfort Purposeful Productive	vs Distress vs Aimless vs Non-productive

Note that each of the verbal categories is subdivided into two categories according to the nature of the nonverbal events that parallel the verbal events. Hence there are 14 categories in the system: 1+, 1-, 2+, 2-, etc.

The encoding would remain 3+ only as long as all criteria were met. The 3- code is used whenever the teacher loses credibility as the result of incongruence between verbal and nonverbal, whenever the students cannot receive the message (they cannot hear or see the message) or whenever the students clearly lose interest in the lecture and stop listening. The principle behind the use of the positive nonverbal symbol is simply that the encoded and transmitted message must be congruent and the message must be received and decoded.

2. Content Categories

Categories 3 and 5 relate to the ordinary tasks of the classroom: the teaching-learning task and transmission of content. Category 3 includes all teacher-talk relative to content transmission: lecturing, questioning and so forth. As the observer records category 3 he is especially concerned with the student response to the teacher-talk and with the credibility of the message.

The contrasting adjectives listed under the 3+ and 3- categories are suggestive in nature. They are designed to assist observers decide between + and - but are not exhaustive criteria.

Category 5 is the complement to category 3; it contains all student-talk relative to the task at hand. Because this is a student-talk category the most critical questions concerning the communication are whether the teacher is sincerely listening to the

student and whether the communication is complete. It is vital that the student understand that the teacher is interested in and values what he says. Hence in category 5 the assignment of the nonverbal symbol hinges largely on that essential concern. Again the adjective pairs listed under 5+ and 5- are intended to guide the observer, not limit him.

3. Institutional Category

Category 4 is a teacher-talk category for which there is no reciprocal student category. This category is for events of an institutional nature. Teacher-talk about discipline, control or other topics related to the need to keep the institution moving are recorded in this category. It is certainly possible for a 4+ to be encoded. For example, if in the middle of a geography lesson the teacher digresses to give brief instructions on how to open a map which the class is about to use, the event might well be a 4+.

Control, in the American school, is traditionally a function of the teacher. Students just do not give orders or justify authority. Even in these days of student power such actions on the part of the students would mean an automatic breakdown of the ongoing lesson and would result in a crisis beyond the scope of ordinary classroom activity. For these reasons it was determined that category 4 needed no student-talk compliment.

4. Personal Development Categories

Categories 1, 2, 6 relate to the personal development of the student. The talk which is encoded in any of these categories may, under some conditions, convey a content or institutional message but the distinguishing characteristic of the talk in these categories is that the student's self-concept and ego development are intimately involved.

Category 1 is the teacher-reinforcement-talk category. Here the teacher is building the student's self concept through the acceptance of feeling or the issuance of praise. Nonverbally, the concern is whether the student understands the reinforcement to be genuine, sincere, appropriate. The observer pays close attention to student response to teacher praise.

Category 2, also a teacher category, contains any teacher-talk which involves the development of a student idea. This category is a content category in that the teacher is talking about the task at hand, but it is also a reinforcement category in which the student receives important psychological support because he is being given credit for initiating the event. Here the nonverbal dimension is focused on the support function of the teacher. A 2- means that teacher use of the idea may not have been appropriate.

Category 6 is a relatively infrequent category dealing with student-talk about personal needs. A student request to be excused is recorded 6, as is a student complaint about the behavior of another student. As in category 5, the nonverbal dimension is largely concerned with the student's view of the teacher's reception of the message.

On some occasions category 6 can be used for student-talk about content. For example, an old problem which a student fails to understand and which is preliminary to the current lesson would be encoded as 6 if the rest of the class had already surpassed this particular hurdle. The event is a 5, content relevant to the current lesson, if the rest of the class is clearly concerned with the same problem.

5. Miscellaneous Category

Category 7 is the miscellaneous, silence or multiple talking category. It is used whenever there are short pauses (7+), or a breakdown of the large group atmosphere (7-). Episode Encoding begins and ends with a 7+ in order to permit proper matrix analysis of the data.

Category seven is used only rarely during the lesson. It is not used whenever there is an exclusively nonverbal message event. If the teacher is writing on the chalkboard during a period of silence the interaction is a 3+ or 3- depending upon the nonverbal tone of the

event. Only if student attention wanders and group interaction breaks down does category 7 apply.

V. Encoding Procedures

The following is a set of encoding directions which are used by Mini-TIA observers to select the proper categories.

Ground Rules for Mini-TIA Encoding

1. Recording Mini-TIA requires that the observer LOOK at the teacher AND class to record the nonverbal dimension of the interaction.
2. Record EVERY change in the interaction even if the change occurs between the three second intervals. Compensate for excess tallies by slowing the subsequent recording pace.
3. Try to record 20 tallies per minute...the absolute minimum is 17 tallies per minute and the maximum is 22 tallies per minute.
4. Do not change categories until the change is CLEARLY evident in the interaction. React to the total interaction; react to the overall tone of the event as revealed by both verbal and nonverbal events.
5. The observer must attempt to record the interaction from the point of view of the student as much as possible.
6. Use a 7+ tally to start and end the lesson. Also insert a 7+ between two student speakers. This provides a demarkation between otherwise continuous 5's and 6's.
7. The repetition of a student answer by the teacher can constitute elicitation or praise (category 1) or it might be a speaking habit which should be recorded as a 3.
8. The use of a student idea (category 2) refers to genuine use of the idea is developed and becomes a part of the framework of the lesson. Do not record a 2 for insincere use of student ideas. Mere repetition of the student idea is a 3. Record the 2 when it is clear that the teacher is actually using or developing the idea.

9. A teacher joke is recorded as a category 1+ if the joke relieves tension and is not made at student expense. If the joke makes fun of the student record a 4-.
10. Student recitation in unison is a category 5. Group work that does not have a single focus of attention is a category 7. Extended group work should be deleted from Mini-TIA analysis.
11. 3- includes such teacher behaviors as looking out the window or looking at the chalkboard for an excessive period. The minus is assigned whenever there is a breakdown in the interaction, a lack of congruence or a mis-interpretation of the interaction by either the teacher or the students.
12. The concern is process not microscopic details.

The Mini-TIA observer encodes the classroom interaction every three seconds for the duration of the episode. It is not necessary, however, to make a detailed and instantaneous judgment each three seconds; the concern of the observer is with EVENTS rather than microscopic mannerisms. Therefore, the observer may record a series of dots until he is absolutely certain of the proper category designation. Then he records the category symbol. The sample shown in Figure 2 demonstrates how an observer has left dots where the event continued and before he made his judgment of the proper category designation. All of the dots in the sequence carry the category designation of the first number after the dots.

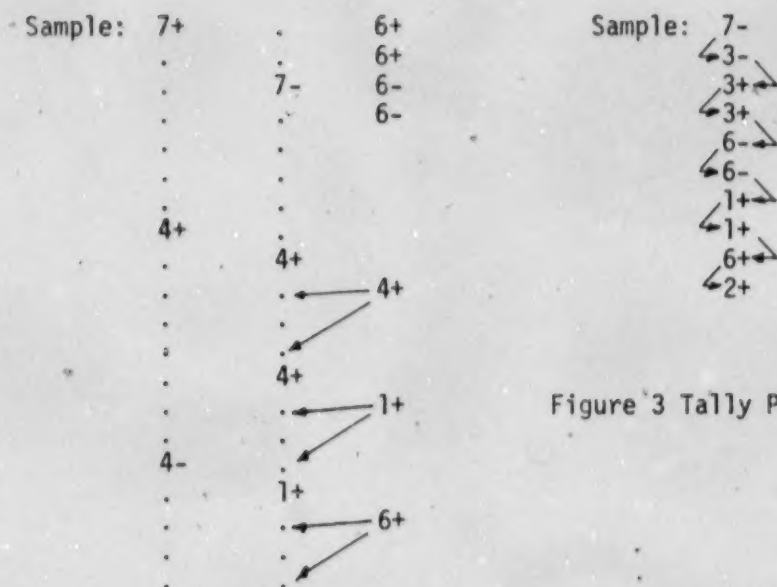


Figure 3 Tally Pairs

Figure 2 Tally Format

Notice that the recorded columns are 20 tallies long. At three seconds per tally each column represents one minute of classroom interaction. This provides a convenient method of locating particular bits of interaction. The sample is two minutes twelve seconds long.

Once the events have been recorded in tally form the numbers are paired so that they may be recorded in the Master Mini-TIA Matrix (Figure 4). The first number of each pair is placed in the row of the matrix and the second number represents the column of the matrix.

In Figure 3 the number pairs are (7-, 3-), (3-, 3+), (3+, 3+) and so forth. The first pair (7-, 3-) is recorded in the 7- row and

	1+	2+	6+	1-	2-	6-	3+	5+	3-	5-	4+	4-	7+	7-	T
1+															
2+															
6+															
1-															
2-															
6-															
3+															
5+															
3-															
5-															
4+															
4-															
7+															
7-															
T															
g															

Figure 4 Master Mini-TIA Matrix

the 3- column. After all tallies have been recorded a total for each row and column is computed. The row and column totals match providing a means of checking the matrix construction process.

Learning to use Mini-TIA is relatively simple. Usually the observers begin by discussing the categories in a group setting until there was substantial agreement upon category definitions. Sample video tape episodes should be used in teaching this encoding process.

Timing practice is simplest when it begins separately from the process of making category designations. When the observers feel secure in their timing ability, practice coding of small episodes can begin. The major instructional problem with this system is the observer tendency to spend too much time looking at papers and not enough time looking at the video monitor screen. This tendency can be overcome with additional practice.

An important characteristic of an analytical instrument is the quality of inter-professional communication engendered by the system. The data produced by an analytical system must be understood by the people utilizing it. In part this is why all particular applications of such devices should begin with a check on the operational state of the tool. Checks of this type usually end with a reliability check to confirm observer mastery of the system.

VI. Data Interpretation

Interpretation of encoded Mini-TIA data can take many forms depending upon the particular objectives of the teaching analyst. The more commonly utilized techniques will be discussed here. It is unlikely that all of these procedures would be utilized in individual cases, but combinations of two or three approaches to data interpretation are likely to be appropriate.

1. Examination of Encoded Tallies

Where classroom episodes are marked by large scale transitions in interaction or where the analyst is especially concerned about the details of particular exchanges, direct examinations of encoded tallies can reveal important information about specific events. Simple examination of tallies can identify segments of the videotape which should be re-examined. In this way glaring errors in nonverbal mannerisms may be isolated and awkward transitions in interaction can be located. In many cases the investigator may discover that encoded tallies cover more than one communication episode. On these occasions the wise course is to pursue separate analyses for each lesson segment. This is a vital point, for other methods of data analysis involve generalization of information, a procedure which remains valid only as long as data is drawn from a single episode.

2. The Category Transition Matrix (Master Matrix)

The major instrument for the interpretation of Mini-TIA data is the Master Matrix which presents in tabular form summations of all transitions which occurred in the lesson. Although similar to that used with other observational tools, the matrix used with Mini-TIA (Figure 4) is unique in that it provides data arrangement by zones of interaction larger than individual categories. Categories 1, 2, 6, for example, are grouped together in a personal developmental zone (Figure 5). There are also smaller zones composed of individual categories (Figure 6).

Figure 7 illustrates the nature of individual cells in the Master Matrix. The cells arrayed along the diagonal from upper left to lower right of the matrix are known as steady state cells. The tallies in these cells represent communication events which continued for more than one three second interval. Cell (3+, 3+) contains the tallies representing extended teacher content presentation which is nonverbally positive; this is a steady state cell.

All cells in the matrix, excepting only steady state cells, represent transitional events. The tally recording directions call for the first tally to be placed in a row and the second tally to be placed in a column (See previous section). Consequently, the kind of transitions represented by cells are from row to column. Cell (2-, 6+) represents a transition from category 2- to category 6+. As

	1+	2+	6+	1-	2-	6-	3+	5+	3-	5-	4+	4-	7+	7-	T
1+															
2+		PERSONAL DEVELOPMENT ZONE						PERSONAL DEVELOPMENT FOLLOWED BY CONTENT				PERS. DEV. FOLLOWED BY CONTROL			
6+															
1-															
2-															
6-															
3+		CONTENT FOLLOWED BY PERSONAL DEVELOPMENT						CONTENT TRANSMISSION ZONE				CONTENT FOLLOWED BY CONTROL			
5+															
3-															
5-															
4+		CONTROL FOLLOWED BY PERS. DEV.						CONTROL FOLLOWED BY CONTENT				CONTROL ZONE			
4-															
7+															
7-															
T															
%															

Figure 5 Major Mini-TIA Matrix Zones

	1+	2+	6+	1-	2-	6-	3+	5+	3-	5-	4+	4-	7+	7-	T
1+	POSITIVE														
2+	PERS. DEV.														
6+	ZONE														
1-				NEGATIVE											
2-				PERS. DEV.											
6-				ZONE											
3+							POSITIVE								
5+							CONTENT								
3-									NEG.						
5-									CONTENT						
4+															
4-															
7+															
7-															
T															
%															

Figure 6 Secondary Mini-TIA Matrix

	1+	2+	6+	1-	2-	6-	3+	5+	3-	5-	4+	4-	7+	7-	T
1+	S											P			
2+		S										P			
6+			S									P			
1-				S								P			
2-					S							P			
6-						S						P			
3+							S					P			
5+	F	F	F	F	F	F	F	S	F	F	F	P	F	F	F
3-									S			P			
5-										S		P			
4+											S	P			
4-												P			
7+												P	S		
7-												P		S	
T															
%															

F -- 5+ followed by another category
 P -- 4- preceded by another category
 S -- Steady State Cells

Figure 7 Master Matrix Cell Types

illustrated in Figure 7 the tallies in the 5+ row are followed by their column, and the tallies in the 4- column are preceded by their row designation.

Once completed, the matrix reveals significant data about the frequency of particular kinds of communication skills which occurred in the episode. These transitions reveal whether positive student talk is followed by teacher support or a less desirable behavior. The transitions reveal information about the kind of lesson: was it a lecture, or a discussion? As the analyst gains experience in matrix interpretation the analytical depth offered by the matrix will become apparent.

3. The Zone Transition Matrix

The organizational pattern of the Master Matrix makes possible economical generalization of data into zones of interaction (Figures 5 and 6). Often interpretation of event shifts from one small zone to another can be made directly from the master matrix. There are, however, certain specialized situations which require a more general re-coding of the Mini-TIA data into a Zone Transition Matrix. In these cases the researcher will determine that the grouping of certain categories might be advantageous. It is up to the researcher to determine the categories to be so grouped. A specialized matrix is constructed by totaling all transitions recorded on the master matrix within each zone. The interpretation of this matrix is similar to that of the Master Matrix. Figure 6 is, in effect, the author's preferred zonal matrix.

4. Statistical Summaries and Formulae

Statistical analyses that can be applied to the data presented in the Master Matrix are endless. In general, the individual investigator will need to select the particular measures that best suit the application.

These are some principles which should be followed:

1. The statistics should be based upon the totals recorded at the bottom of the Master Matrix.
2. The matrix totals do not apply to tallies; they apply to transitional events.
3. The totals of the columns and rows of the matrix must be equal.
4. The grand totals of rows and columns must agree.
5. The grand total of transitional events will be one less than the total encoded tallies.

These facts can serve as checks on data processing.

Some of the statistical formulae currently in use with Mini-TIA follow. Special attention is usually given to the teacher's verbal-nonverbal congruence ratio since it reveals the proportion of positive teacher transmitted communication events. The elicitation ratios examine the teacher's encouragement of student participation.

These statistics currently in use with Mini-TIA can be revealing to analysts. However, no research data base exists which can give definitive scales for the interpretation of these statistics. The Mini-TIA statistics are:

Summary Percentages:

1. Positive Personal Development
Add percentages in 1+, 2+, 6+
2. Negative Personal Development
Add percentages in 1-, 2-, 6-
3. Postive Content Transmission:
Add percentages in 3+, 5+
4. Negative Content Transmission:
Add percentages in 3-, 5-
5. Control and Silence Summaries:
Revealed directly by category percentages.

P/C Ratio

Ratio of positive personal development to control:

$$PC = \frac{\Sigma (1+), (2+), (6+)}{\Sigma (4+), (4-)}$$

Percentage of Teacher Congruence

$$TC = \frac{\Sigma (1+), (2+), (3+), (4+)}{\text{Total teacher talk}} \times 100$$

Percentage of Teacher Elicitation Effort

$$EE = \frac{\Sigma (1+), (2+)}{\text{total teacher talk}} \times 100$$

Elicitation Response Ratio

$$ER = \frac{\Sigma (1+), (2+)}{\Sigma (5+), (6+)}$$

5. Event Cycles

All of the preceeding analytical procedures assist in the interpretation of transitional patterns on a summation basis. It is possible to extend the analysis of interaction to the identification of typical

patterns or cycles of interaction which occurred frequently during the lesson.

Because the column refers to the category that followed the row in particular transitions, one can say that in the (1+, 3+) cell a 3+ event followed the 1+ event. What happened next? Clearly the next transition was from 3+ to one of the other categories. It might be a (3+, 1+), (3+, 2+), (3+, 3+) or any similar transition. The nature of the matrix permits us to proceed in a clockwise fashion to identify the most likely (most frequent) cell. In the example in Figure 8 the subsequent cell turned out to be (3+, 3+). This complex process can reveal significant data about habitual patterns of interaction.

Figure 8 demonstrates the modeling technique on the data produced from an actual lesson. In this case a six minute lesson taught by a student teacher was analyzed from video tape by the same student. Some of the characteristics of this lesson are the typical large tally concentrations in the teacher content presentation cell (3+, 3+) and a large concentration in the steady state cell (2+, 2+). This concentration indicates a positive use of a student idean during the episode. An examination of other individual cells would reveal similar data.

This lesson is notable for the lack of tallies in the control zone. The lesson remained in the content and personal development zones and the related transition zones.

	1+	2+	6+	1-	2-	6-	3+	5+	3-	5-	4+	4-	7+	7-	T
1+							5	2							7
2+		19					5	1							25
6+															0
1-															0
2-															0
6-															0
3+							31	21			1				55
5+							11	3	1		1				27
3-									1						1
5-															0
4+								1					1		2
4-															0
7+							1								1
7-															0
T	7	25	0	0	0	0	53	29	1	0	2	0	1	0	118
X	6	21	0	0	0	0	44	24	1	0	2	0	1	0	

Teaching Cycles:

$$PC = \frac{16}{1}$$

$$EE = 33.6\%$$

1. 3+, 3+, 5+...

2. 3+, 3+, 5+, 1+...

3. 3+, 3+, 5+, 2+, 2+...

$$TC = 98.9\%$$

$$ER = \frac{1.10}{1}$$

Figure 8 A Sample Matrix: Six-Minute
Education 435 Lesson

The modeling technique, referred to above, reveals three interaction cycles in this lesson. The primary cycle (the most used cycle) was a straight content cycle moving from extended 3+ to brief 5+ and back again. This cycle was completed eleven times (the lowest number in the cycle chain indicates the number of cyclical completions). The secondary cycle included the (2+, 2+) category discussed earlier and was completed five times. This indicated that the six minute episode featured lively interaction.

More data about this particular lesson is revealed by the statistical summary at the bottom of the matrix. The totals are converted to percentages to reveal that in this case the instructor talked in category 3+ for 44% of the lesson. The total of all teacher-talk for this lesson (73%) is about typical for most classroom situations.

VII. Conclusion

Initial research applications have indicated that Mini-TIA meets the rigorous requirements of communication theory and existing teacher behavior research. This tool shows potential for consideration of the client's view of communication events because the observer's attention is on the total communication process rather than on teacher behavior. This system operationalizes a nonverbal dimension to compliment and extend the customary verbal analysis. This new framework is reciprocal: it gives equal attention to student behavior and to teacher behavior.

Mini-TIA is no panacea for educational researchers. Mini-TIA has significant limitations. Two of the more important limitations of the system are:

1. Mini-TIA is essentially a large-group framework.
The concept and research background arose from research on large group instruction, although. It is believed that the reciprocal categories will permit application of this tool to small group instruction and even to one-to-one counseling sessions.
2. Mini-TIA is a time-sampling analytical device.
Each encoded event is given the same importance.
When certain events assume more importance than others time sampling systems cannot account for the differences.

Mini-TIA is not based upon some holy revelation which assures universal salvation for educators. The users of this, or any other analytical device, must familiarize themselves with the conceptual basis of the instrument and must determine whether the instrument meets

local needs. Every tool of this type is based upon certain assumptions which color the produced data. These assumptions must match the purposes and intent of the researcher. Otherwise unrecognized data distortion will occur.

The users of Mini-TIA have found new perspectives of classroom communication, of teacher behavior and of student behavior. These new vistas are open to any educator who determines his priorities and concerns prior to the application of Mini-TIA.

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